

Amendments to the Claims:

This listing of claims replaces all prior versions, and listings, of the claims in the application.

Listing of Claims:

Claim 1 (currently amended): A rotary assembly comprising a rotatable shaft; a sleeve journaled on the shaft and adapted to be stationary during rotation of the shaft; an earth vector sensor mounted for rotation with the shaft, the earth vector sensor being responsive to a given physical parameter in a direction substantially radial to the shaft; and an orientation signal generator which ~~comprises means for generating~~ generates a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, and ~~means for deriving~~ derives from the pulse train and the output of the earth vector sensor the angle between the earth vector and a given position on the sleeve.

Claim 2 (currently amended): A rotary assembly comprising a rotatable shaft; a sleeve journaled on the shaft and adapted to be stationary during rotation of the shaft; an earth vector sensor mounted for rotation with the shaft, the earth vector sensor being responsive to a given physical parameter in a direction substantially radial to the shaft; and an orientation signal generator which generates a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, and derives from the pulse train and the output of the earth vector sensor the angle between the earth vector and a given position on the sleeve, wherein A downhole assembly adapted to form part of a drill string and comprising a rotary assembly according to claim 1, and in which the earth vector is the component transverse to the drill string axis in the vicinity of the assembly of the earth's gravitational or magnetic field along an axis perpendicular to the shaft axis local magnetic field or gravitational field.

Claim 3 (currently amended): An assembly according to claim 1 or claim 2, in which the orientation signal generator ~~means for generating a pulse train~~ comprises a directional sensor arranged radially of the shaft and cooperating with a plurality of elements equispaced around the circumference of the sleeve for generating the pulse train.

Claim 4 (currently amended): An assembly according to claim 3, in which ~~said elements are ferromagnetic segments, and~~ the directional sensor is a coil and the plurality of elements are ferromagnetic segments that cooperate with the coil to generate the pulse train.

Claim 5 (original): An assembly according to claim 4, in which the ferromagnetic elements are 24 in number.

Claim 6 (currently amended): An assembly according to claim 23, wherein the orientation signal generator comprises a directional sensor arranged radially of the shaft and cooperating with a plurality of elements equispaced around the circumference of the sleeve for generating the pulse train, and in which said deriving means operates to integrate the earth vector sensor output over each of a number of successive part-revolutions of the shaft to provide a series of simultaneous equations, and to solve these equations to provide an orientation angle for each of said plurality of elements with respect to the earth vector.

Claim 7 (original): An assembly according to claim 6, in which said part-revolutions are quarter revolutions.

Claim 8 (currently amended): An assembly according to claim 6, in which said simultaneous equations are as defined in equations (vi) to (ix) ~~above~~ below:

$$Q1 = -K1.\sin\alpha + K1.\cos\alpha + K \quad \text{(vi)}$$

$$Q2 = -K1.\sin\alpha - K1.\cos\alpha + K \quad \text{(vii)}$$

$$Q3 = K1.\sin\alpha - K1.\cos\alpha + K \quad \text{(viii)}$$

$$Q4 = K1.\sin\alpha + K1.\cos\alpha + K \quad \text{(ix)}.$$

Claim 9 (currently amended): A downhole assembly according to claim 2, in which the sleeve forms part of a gamma ray detector, ~~the sleeve being apertured to permit that detection of gamma radiation strength transverse to the drill string axis.~~

Claim 10 (original): A method of sensing the angular position of a rotary assembly which comprises a rotatable shaft and a sleeve journaled on the shaft and adapted to be stationary during rotation of the shaft; the method comprising sensing an earth vector along an axis transverse to and rotating with the shaft, generating a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, and deriving

from the pulse train and the earth vector the angle between the earth vector and a given position on the sleeve.

Claim 11 (new): A rotary assembly comprising a rotatable shaft; a sleeve journaled on the shaft and adapted to be stationary during rotation of the shaft; an earth vector sensor mounted for rotation with the shaft, the earth vector sensor being responsive to a given physical parameter in a direction substantially radial to the shaft; and an orientation signal generator which comprises means for generating a pulse train representing rotation of the shaft relative to the sleeve as a predetermined number of pulses per revolution, and means for deriving from the pulse train and the output of the earth vector sensor the angle between the earth vector and a given position on the sleeve.